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AUTHOR Richards, Les
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ABSTRACT

Piagetian stages of cognitive development are reviewed, and what teachers of geography skills, particularly map skills, can do to make use of Piaget's theory of child development is discussed. Piaget describes children at four different stages: (1) sensorimotor stage--birth to 2 years, (2) preoperational stage--ages 2-7, (3) concrete operational stage--ages 7-12, and (4) formal operational stage--ages 12 and older. The characteristics that a child displays at each of these stages are described. Geography teachers must find out at what stage their students are in terms of their experiences, develop learning activities which build on these experiences, and structure other experiences which take into account the four forces that shape learning--i.e., maturation, the environment, equilibration, and socialization. Thus, with children who are at the preoperational level, for example, map skills activities might be taught by having students view and draw objects from different perspectives or identify familiar objects from air photographs. At the concrete level, students could construct models of familiar areas. Students at the formal operational level could do map work emphasizing the use of symbols. (RM)

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Piagetian Theory as an Organizer for Geographic Skills and Experiences

Les Richards

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The purpose of this paper is to discuss how Piaget's thoughts on a theory of cognitive development can be used to organize the development of geographic skills. It should be noted at the outset that Piaget did not develop a learning theory. In fact he did not view himself as an educator in any sense of the word. Others have interpreted his work on cognitive development sometimes in a very specific and narrow fashion which ascribed educational implications to Piaget which, I am sure, he did not intend. Yet others, notably at the University of Oklahoma, have attempted to develop a consistent theory of learning based on an open and honest appraisal of Piagetian theory. While this theory has been developed in science education, I am sure it may have implications for social studies education in general and geographic education in particular.

At the risk of being repetitious and perhaps redundant, let me survey briefly and comment on the Piagetian stages of cognitive development. Then I shall attempt to explain the theory of learning developed by Oklahoma and show how it has applications to learning geographic skills.

Piaget describes children at each of four different stages.[1] The first, or sensorimotor stage, occurs between birth and 2 years of age. Mention should be made at this time that the age parameters are only approximate and that there are factors, to be discussed later, which can cause a movement from one stage to another outside the parameters. Of importance to us in this first stage is that one of its characteristics is egocentricity. This term is descriptive rather than derogatory, i.e. an egocentric child is incapable of adopting the point of view of others. Their world is the world as they react to it.

Four achievements are important in this stage and the degree(s) to

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[1] Adapted from Guy Lefrancois.

which they develop have important connotations to future learning. Toward the end of this stage children will have begun to symbolize and communicate, a significant attainment since language accelerates thinking and makes possible the transition to a more cognitive interpretation of the world. Children in this stage develop the object concept meaning that they discover that objects have a permanence and identity independent of perception. In other words, the world continues to exist even when it is not being seen, felt, heard, smelled or tasted--or does it? The third achievement is that the child learns to coordinate separate activities. While this ability tends to be taken for granted by we adults, it is no small or unimportant event for the child. In the absence of cooperation between such activities as looking and reaching, the child could not obtain the object he looks at and desires. The final achievement is the recognition of cause and effect relationships. Children are not born knowing that if they reach toward an object, they can grasp it and bring it closer to themselves--they must learn. It is this kind of learning that allows them to develop intentionality for until children know what the effects of their activities will be, they cannot clearly intend these effects. These are the achievements which the child should have been able to attain during this stage. It is apparent that failure to attain one/some/all is going to affect his future learning. The converse is also true.

The second stage is that of preoperational thinking (2-7 years). The first part of this stage, preconceptual thinking (2-4 years), is characterized primarily by the child's inability to understand all the properties of objects/classes. This means that children react to all similar objects as if they were identical. All men are "Daddy"; all

women "Mummy"; all animals (if they have one) "Doggie" and all the world is simple. Every teddy bear like his is his. While these children can identify objects, they cannot distinguish between apparently identical members of the same class. This mode of thinking does have some advantages. Santa Claus continues to be the one and only even though he may be seen in ten different places on the same day!

The other feature of preconceptual thinking is that it is transductive rather than inductive or deductive. While the last two types are forms of logical reasoning--inductive moving from specifics to a generalization; deductive going from the generalization--transductive reasoning makes inferences from one specific to another. Thus "My dog has hair; that thing there has hair; therefore that thing is a dog" may be a correct piece of transductive reasoning. But the thing was a skunk!

The second part of this stage is that of intuitive thinking (4-7 years). Children have now reached a more complete understanding of concepts. Thinking is somewhat more logical although governed more by perception than by logic. Perception plays an important role in conservation problems where an object or quantity is changed in appearance but not in quantity. If children are questioned about a quantitative attribute and they think it has changed, then they have not acquired conservation. Students tend to take note of the misleading perceptual feature which is often the most obvious. It should also be noted that reasoning now is egocentric in that an intuitive child has difficulty in accepting the mental point of view of others. (Compare with sensorimotor child who cannot adopt others' physical point of view.) Also, children in this stage cannot classify--they can deal with single classes, but cannot reason about subclasses within the larger grouping.

Concrete Operations and Preoperational Thought is the third stage (ages 7 to 12 approximately). Children now have three new abilities: they can deal with classes, with seriation and with number. They also begin to acquire the various conservations. Specifically they can deal with nested sub-classes, arranged objects in order and be aware of both cardinal (class) and ordinal (rank) properties of number. In this stage thought structures are applied directly to real objects. Children cannot deal with abstractions unless they can be tied to the reality. In the final formal operational stage (12+), thinking is no longer restricted to the concrete or potentially real but can move to the hypothetical. Children can reason from real to possible and vice-versa and can become very upset at the seeming irresponsibility of a generation of adults which has brought itself to the brink of untold disaster. The logical-deduction approach common to social studies inquiry strategies fits appropriately into this period. To illustrate, if people are classified as male (M), female (F), and also as adults (A) and children (C), and children are asked to describe the possible population on a newly discovered planet, a concop child will find 4 groupings, a formalop 16. The view that social interaction should be a major component of social studies instruction--children sharing experiences, discussing and disputing and listening--derives from Piaget's contention that through these means, children begin to move away from egocentrism. As the child increasingly talks with others, s/he begins to realize the existence of alternative points of view. Defending and explaining one's own ideas, as well as learning to listen to others, helps to clarify thinking. Thus conversation promotes not only social but cognitive growth as well.

If we are to state, in point form, a summary of Piaget which might

constitute a theory of learning, we come up with the following:

1. The acquisition of knowledge is a gradual developmental process made possible through the interaction of a child with the environment.

2. The sophistication of children's representation of the world is a function of their stage of development. The stage is defined by the thought structures they then possess.

3. Maturation, the environment, equilibration and socialization are the forces that shape learning. (Lefrancois, p. 205)

The question of what moves the child from one stage to another is of paramount importance to the educator. Piaget (1964) has stated four possible factors (item 3 above) which shape learning:

1. Maturation--cognitive development follows a fixed order of stage progression. It does not mean that it proceeds at a fixed rate of speed nor that it necessarily occurs at the age(s) stated. The age parameters can be influenced by environmental factors in the child's physical and social milieu. The maturation of the nervous system can do no more than determine the totality of possibilities and impossibilities at a given stage. A particular social environment remains indispensable for the realization of these possibilities. It follows that their realization can be accelerated or retarded as a function of cultural and educational conditions (Inhelder & Piaget, 1958, p. 337).

2. Experience in the form of interaction with the child's physical environment is especially important especially at the more concrete stages of cognitive development. The development of concrete operational thought occurs through the manipulation of concrete objects as well as through the objects themselves. The child learns to abstract from the object and from acting upon the object.

3. Social experience--occurs through social interaction. It occurs through education as well as through other types of linguistic experience. It moves the child from an egocentric, individualized mode of thought to more sociocentric, consensually validated modes of thinking. Rules are considered as sacred, external, unchangeable and absolute by the egocentric child whereas the sociocentric child sees rules as important social conventions that can be changed if all agree. Movement occurs when child enters concrete operational thought. Peer group participation is important in the movement.

4. Equilibration--is the balancing of assimilation and accommodation which occurs within a person as experiences result in new knowledge. Assimilation is the incorporation of the environment into present patterns of behavior. Accommodation is the change in the intellectual structures which is necessary for the person to adjust to demands which the external environment makes on him/her. The two together make up adaptation which is the equilibrium in the interaction of the individual and the environment. Through equilibration, knowledge is internalized and organized in a step-wise fashion.

Piaget and Subject Matter

> Curriculum planners will have to take into account the work of Piaget on children's intellectual development. When the world is defined as action-linked concepts, then the child must encounter knowledge through his own actions. When he has constructed a system of concrete operations to deal with reality, the teacher must present [his/her] material in terms of specific, concrete examples. When the formal stage is reached, however, theory is not only possible, but a necessary means of codification of experience and extending the use of the mind. (Adler in Sullivan, p. 17)

It appears that Piaget's educational contribution can be in the area of structure and sequencing of subject matter at appropriate developmental

levels. It should be mentioned here that for Piaget, the concept of structure lies not in the discipline (a way of stating how things are related) but in the way the individual experiences what is to be known. Thus it is a property of the child's mind. Piaget (1964) stated that knowledge is not a copy of reality. To know an object or an event is not to look at it and make a mental copy but to act on it. To know is to modify, to transform and to understand the process involved and, as a consequence, understand how the object is constructed. The goal in education then becomes not an increase in the amount of knowledge but the creation of possibilities for the child to invent and discover. Teaching means creating situations where structures can be discovered; it does not mean transmitting [merely] structures which may be assimilated at nothing other than a verbal level. Thus Piaget's position in education would be quite similar to that of Dewey in the sense that the curriculum is to be geared to the child's cognitive level and not the converse. The problem then becomes one of matching the subject matter to the growing conceptual abilities of the child. (Compare with Jack Frymier's Annehurst Curriculum Classification System.)

The question, then, for us comes down to this: What can we do as teachers of geographic skills, and particularly map skills, to make use of Piaget's theory of child development? The first answer is to try to enhance the child's cognitive development by making use of the four factors: maturation, experience, social experience and equilibration which Piaget says encourages cognitive development. Before a child progresses from one intellectual stage to another, his/her cognitive structure must have been broadened through physical and social interactions with people and objects to the degree necessary to meet the

incipient characteristics of the next hierarchical level. In this process, the child's mental framework has been expanded to "contain" the preceding stages s/he has travelled through to permit intellectual operations at this higher level. For example, a child will not be able to handle wholly such logical operations as theorizing and hypothesizing unless s/he has developed the mental structure to allow these increasingly complex intellectual activities to take place through social and physical interactions and experiences in the preceding stages. This fact is a primary reason why the chronological ages Piaget offers for movement from one stage to another is a relative one and subject not only to genetic makeup but also to the kinds of learning experiences they have undergone. Unfortunately many people who have adopted and written about Piaget have neglected to take this relativity into account.

As geography teachers, we can begin by providing the child with experiences which will in fact increase his cognitive development and, by making use of those which he already has. I, among others, have been accused of trying to teach map skills to students who are too young. I do not believe that I can say to students, "You are only in Grade 1; you are only six years old. You are therefore too young to learn about symbols!" If this is true then we should not be teaching children to read until they are at least eight or ten years old. We have to learn to base the teaching of skills and concepts on the child's experience. This involves (1) finding out where students are in terms of their experiences, (2) developing learning activities which build on those experiences, and (3) structuring other experiences which take into account the four factors to help develop their cognitive capacities and learning frameworks.

Thus with children who are at the preoperation level, map skills activities might be organized as follows: viewing and drawing objects from different perspectives; use of three-dimensional models; encouraging block building play; identifying familiar objects from air photographs (ages 2-7 approximately).

Concrete level: construct models of familiar area; draw pictures of familiar places and rooms; neighborhood using air photographs. Do not stress distance, scale, perspective (ages 7-11).

Formal operational: map work emphasizing use of symbols; cardinal directions, map proportion and scale, maps of countries (11-13). More complex work on scale, coordinates, latitude and longitude, contour lines, topographical maps (13+).

This would be one way of designing map skills if one followed precisely Piaget's stages. It does postpone some activities which many children will learn several years before they are scheduled in school. It also presupposes that the stages proposed by Piaget are firmly fixed in both age range and in terms of what they can do in each stage. In the belief that the human brain and mind is flexible and often capable of more than we think if we can find the right spark plug, I have attempted to introduce some skills much earlier than suggested by using strategies which seem to fit the situations. Here are some examples.

Many of us have not made use of the hours that a child has spent in front of a television set before he comes to school. During this time he has acquired perceptions of space which he would not otherwise have. S/he is therefore better able to visualize what various parts of the earth look like from a bird's eye perspective. Air photographs and various kinds of maps are within the range of understanding of students in Grades

2 and 3 provided that they have the experiential background and that the scale of both photographs and map is not too small.

Details of air photographs are easily learned even by very young students if they have the opportunity to experience the details first. For example, if one drives a student slowly through a clover-leaf type of intersection explaining what is happening as we go, it is then possible to ask the student to draw what s/he thinks the shape is. The drawing may be discussed and errors corrected by revisiting the site. It is then a relatively simple matter to relate the object, the drawing, the map, and the air photograph.

The child's global concepts are far advanced over what they might have been 10 or 15 years ago. Today's child is truly a child of the universe and the universe is unfolding itself to her/him as it should. S/he has watched a lot of television, s/he has seen the earth in space, s/he knows vicariously various places in the world, and s/he is a child of the computer. S/he is therefore able to comprehend abstractions to a much higher degree--again provided that they are within the realm of experience and that the degree of complexity of the abstraction is not beyond her/him. Thus the child can grasp the concept of coordinates at an earlier age and therefore the concept of latitude and longitude.

Recent experimental research at Oklahoma State University in the application of Piagetian testing and the construction of similar tests to fill gaps in mathematics learning lends support to these ideas. Over the next year I shall be carrying out similar activities in cooperation with O.S.U. in the social studies field.

What then is the outcome of all this? The outcome would seem to be that, in many respects, we should have listened to Dewey a little more.

We must really recognize that kids are different if more of them are going to learn with understanding. This means developing and organizing a variety of experiences at different levels so that kids who are ready to work with symbols or cardinal directions or latitude and longitude may do so regardless of age, regardless of grade.

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